

# A Report on the Cases of Purulent Meningitis admitted to the Northern Ireland Fever Hospital in 1952

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THE Northern Ireland Fever Hospital serves a population of one and a quarter million. Between the 1st January and the 31st December, 1952, 276 cases of suspected meningitis were admitted to the hospital. Intracranial disease was confirmed in 143. Sixty-six had acute purulent meningitis, and 32 had tuberculous meningitis. The others were suffering from acute poliomyelitis (36), subarachnoid hæmorrhage (4), brain tumours (3), brain abscess (1), and congenital hydrocephalus (1). In 64 of the cases admitted nothing abnormal was found, and in the remaining 69 cases an infection outside the cranial cavity had misled the practitioner. These infections were—pneumonia (17), tonsillitis (16), acute otitis media (10), mumps (6), primary tuberculosis of lung (4), gastro-enteritis (3), two cases each of pertussis, sinusitis, influenza, cervical lymphadenitis, and one case each of miliary tuberculosis, rheumatic fever, acute nephritis, pyelitis, and measles.

The 66 cases of acute purulent meningitis are the subject of this report. Of these, 47 had cerebro-spinal fever, 14 had pneumococcal meningitis, 4 had influenzal meningitis, and in one fatal case no organism was grown from the purulent cerebro-spinal fluid. The cases can be divided into age groups as shown in the table below. The number of deaths in each group is shown in brackets.

TABLE.

Organism.	<i>Age in Years.</i>												Total
	0-1 yrs.		1-5		5-10		10-20		40-50		Over 70		
Meningococcus	-	24 (0) ...	17 (1) ...	2 (0) ...	4 (0) ...	—	...	—	...	—	...	47 (1)	
Pneumococcus	-	7 (1) ...	1 (1) ...	2 (0) ...	2 (0) ...	1 (1) ...	1 (1) ...	1 (1) ...	1 (1) ...	1 (1) ...	1 (1) ...	14 (4)	
H. Influenzæ	-	3 (1) ...	1 (1) ...	—	...	—	...	—	...	—	...	4 (1)	
Unknown	-	—	...	—	...	—	...	—	...	1 (1) ...	1 (1) ...	1 (1)	

## DIAGNOSIS.

In the adult, the onset of acute meningitis is sudden with fever, intense headache, rigors, vomiting and delirium gradually deepening into coma. These symptoms associated with neck stiffness and a positive Kernig's sign usually make the diagnosis obvious in the adult patient.

In the infant, the symptoms and signs are rarely clear cut. But in the 178 cases in which the diagnosis before admission was in error only 26 of the patients were

under 1 year and 66 under 5 years. The onset may be abrupt or insidious with little pyrexia. Irritability, vomiting, screaming or convulsions may occur. The classical signs of neck stiffness and rigidity of the hamstrings are most unreliable in infants. A much more important sign is the presence of a tense or bulging fontanelle in a quiet infant. The diagnosis of acute meningitis in infancy has been discussed recently by Hapworth (1953). He emphasises that clinical diagnosis may be very difficult and, if suspected, a diagnostic lumbar puncture should not await the development of typical meningeal signs.

In a febrile patient, stiffness of the neck per se does not necessarily mean meningitis. Local conditions such as tonsillitis or mumps are often the cause in the adult. In infancy such conditions as apical pneumonia or otitis media may result in meningismus. In this series of admissions pneumonia was the revised diagnosis in 17 cases, tonsillitis in 16, otitis media in 10, and mumps in 6.

All cases admitted as suspected meningitis have a diagnostic lumbar puncture. The infecting organism was seen on direct examination of the turbid cerebro-spinal fluid in 21 cases of cerebro-spinal fever, 10 cases of pneumococcal meningitis, and 3 of the cases of influenzal meningitis. If the organism is not seen chemotherapy is commenced on clinical assessment of the case and changed if necessary when the organism is grown. A blood culture may be of value in determining the infecting organism, especially if it is the meningococcus. A positive blood culture was obtained in 8 out of 15 of the cases of cerebro-spinal fever in which this investigation was done.

#### TREATMENT.

Good nursing, adequate fluid intake, orally or intravenously if necessary, effective sedation and the appropriate chemotherapy given immediately, form the basis of treatment. The amount of sedation required varies with the degree of irritability and restlessness seen in the individual patient. An adult may require morphia for immediate sedation. For prolonged sedation oral phenobarbitone or potassium bromide are the drugs used. The dosage varies from  $\frac{1}{2}$  grain phenobarbitone six-hourly in the under one year olds to 1 grain six-hourly in the adult. The comparable dose of potassium bromide is  $3\frac{3}{4}$  grains to 30 grains. A mixture of potassium bromide 30 grains in 1 ounce is used.

A routine chemotherapeutic schedule for each of the groups mentioned in the table is employed. In cerebro-spinal fever patients under 2 years are treated with intramuscular penicillin .25 mega units six-hourly for five days. Penicillin is used in this age group in preference to sulphonamides as it is easily given in effective dosage and obviates the risk of additional injury to the kidneys. In the older age group sulphamezathine affects a rapid cure, unless the patient is vomiting or is comatose, when again penicillin is the treatment of choice. Children are given an initial dose of 2 gm. sulphamezathine, intravenously if possible, followed by 1 gm. six-hourly orally to a total of 12 gm. The adult requires double this dosage. Intrathecal treatment is unnecessary. Intravenous plasma is of value when this acute infection is associated with peripheral circulatory failure.

In pneumococcal meningitis intrathecal therapy with penicillin is used. Daily dosage varies from 5,000 units in the infant to a maximum of 20,000 units in the adult. Five consecutive daily doses are given. This is the average duration of intrathecal therapy suggested by most authorities and a longer course does not seem to give a better prognosis. Both penicillin and sulphamezathine are given systemically. Sulphamezathine dosage is used as described for the cerebro-spinal fever group. The intramuscular penicillin is given for ten days.

Until 1952 the schedule of treatment of influenzal meningitis was intrathecal penicillin and streptomycin, with intramuscular penicillin and streptomycin and oral sulphadiazine. The satisfactory results obtained by this treatment in this hospital were published by McConnell (1950). The *H. influenzae* is sensitive to chloramphenicol and this is now the antibiotic of choice in this infection, as oral medication is simple and effective. However, it must be recognised that relapse may occur with cessation of treatment and this was seen in one of our cases. The child relapsed clinically two weeks after chloramphenicol was discontinued. Lumbar puncture gave a purulent fluid from which *H. influenzae* was again cultured. Cure was affected by a further course of chloramphenicol. One case did not respond well clinically until oral sulphamezathine was also given. The third case was cured on one course of chloramphenicol only. The fourth case died before therapy could be effective. The dosage of chloramphenicol given is 50 mg. per kilogram body weight daily for ten days.

When the infecting organism is *Staphylococcus aureus*, the hæmolytic streptococcus or *B. coli*, therapy depends entirely on the sensitivity of the organism. It is worth noting that chemotherapy given empirically before admission may be sufficient to make the cerebro-spinal fluid sterile though still purulent. The disadvantage is that the organism cannot be isolated and so the necessary schedule of treatment cannot easily be decided, and delay in adequate medication may result.

#### COMPLICATIONS.

The only complication seen in this series was polyarthritis occurring in a boy of three years with cerebro-spinal fever. His elbows and knees became swollen five days after admission. The swelling gradually subsided and normal mobility of all the affected joints returned. There were no cases of prolonged fever, repeated convulsions or persistent vomiting to warrant subdural tap for the diagnosis of subdural effusion. This has been discussed recently by Guthkelch (1953) as a sequel of purulent meningitis.

#### PROGNOSIS.

The majority of cases of purulent meningitis are discharged after a three-week stay in hospital. The cerebro-spinal fluid has usually returned to normal in this time. If this has not occurred the patient is detained in hospital and has a weekly lumbar puncture until a normal fluid is obtained. Normal readings are taken as protein under 40 milligrams, white cells under 10, sugar over 40 milligrams.

At the British Pædiatric Association in 1952, Wolff pointed out that, in the follow-up of 134 cases of cerebro-spinal fever occurring since 1939 in Birmingham

all cases in infants under 6 months showed a retarded intelligence. Deafness was also commoner in infants under 1 year old than in the older child. Clinically it is easy to recognise deafness in a child who could talk prior to contracting meningitis, but it is extremely difficult to detect deafness in infancy. It can be seen that the majority of our cases of cerebro-spinal fever occurred in the under 1 year age group. A long-term follow-up of these cases will be necessary to exclude the grave prognosis with regard to both intelligence and hearing in these infants.

#### SUMMARY OF FATAL CASES.

The one fatal case of cerebro-spinal fever was a boy of 4 years who was transferred from a general hospital. He had been ill for 24 hours with headache and vomiting. On admission he was semi-comatose with a profuse purpuric rash, cold extremities, and a feeble pulse. His blood pressure could not be recorded. He did not respond to intravenous plasma and intramuscular penicillin and died five hours after admission. Permission for a post-mortem examination was not obtained. Transfer of such an ill child is not always advisable, as a long ambulance journey may increase shock and seriously delay treatment. A meningococcal infection kills rapidly and a few hours' delay may be fatal.

In the pneumococcal group there were four deaths. Two cases, a child of 4 months and a man of 76 years died less than 12 hours after admission. A child of 2 years who was progressing satisfactorily collapsed and died suddenly 4 days after admission. The fourth fatal case was a woman of 48 transferred from a surgical unit with pneumococcal meningitis and jaundice. The cerebro-spinal fluid became normal with chemotherapy but she died five weeks after admission. Post-mortem showed necrosis of the liver and pancreas with empyema of the gall bladder. The meninges had returned to normal. Nemir and Israel (1951) pointed out that the addition of penicillin to the therapy of pneumococcal meningitis introduced a new era in the prognosis of the disease. They report an 81 per cent. survival rate in 158 cases described in the literature, treated by combined penicillin and sulphonamide therapy.

The fatal case of influenzal meningitis was a child of 6 months who had been ill for two days prior to admission. She survived admission by only six hours.

One fatal case was probably due to a staphylococcal infection. A man of 76 years was unconscious on admission. He had a three-day history of pain in his left ear followed by otorrhœa, headache, vomiting and a rapid decline into coma. He died seven hours after admission. A penicillin sensitive *S. aureus* was grown from his ear swab. No organism was cultured from his purulent cerebro-spinal fluid.

#### SUMMARY.

In 1952, 276 cases of suspected meningitis were admitted to the Northern Ireland Fever Hospital. The diagnosis was confirmed in 98 cases only. Acute purulent meningitis was found in 66, and of these 59 survived. Tuberculous meningitis was found in 32 cases.

The chemotherapy used according to the infecting organism is described.  
A summary of the seven fatal cases is given.

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#### REFERENCES.

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## REVIEWS

RESPIRATORY FUNCTION : MANAGEMENT IN DISEASE. By Richard D. Tonkin. (Pp. 64; figures 11. 3s. 6d. (paper), 5s. 6d. (cloth.). London : Actinic Press. 1953.

THIS small monograph has three sections, the first devoted to elementary principles of anatomy and physiology of the lungs. The second gives a very brief description of four of the commonest medical conditions of the chest—emphysema, bronchiectasis, bronchopsasm and upper respiratory infections. In the third surgical chest conditions and their treatment is dismissed in three pages.

A major criticism of this booklet is that for breathing exercises in pneumonectomy the reader is asked to see "thoracoplasty" and, when this is found, the reader is again referred to "emphysema," although different technics and the rationale for their use apply to each of these conditions.

It is a great pity the author did not elaborate more fully on the techniques employed, including those for the correction of bad posture. Few physiotherapists have easy access to the larger volumes on Physical Medicine and fewer have a training school for reference. G. G.

POCKET PRESCRIBER AND GUIDE TO PRESCRIPTION WRITING.

By Alastair Cruickshank, F.R.C.P.E. Fifteenth Edition. (Pp. 294 + xv. 5s.). Edinburgh : E. and S. Livingstone. 1952.

THIS excellent little pocket prescriber has been brought up to date in this, the fifteenth edition. It now includes all the modern drugs whose use and dosage has been proved by therapeutic trials. The author has only omitted those not yet standardised or whose use is still confined to hospitals. The various diseases and their therapeutic remedies are extremely well correlated and there is an extremely wide range of practical illustrations. A very worthy edition to an already popular and widely used book, it should be a requisite of every practitioner.